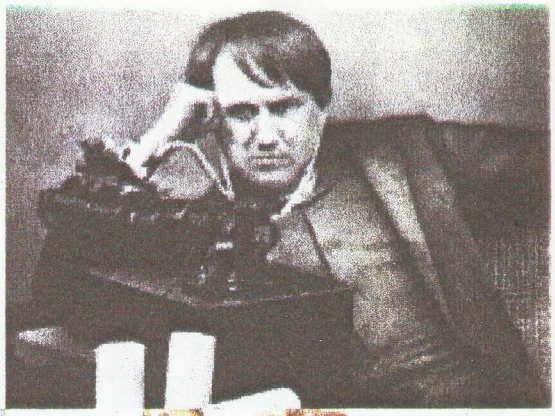
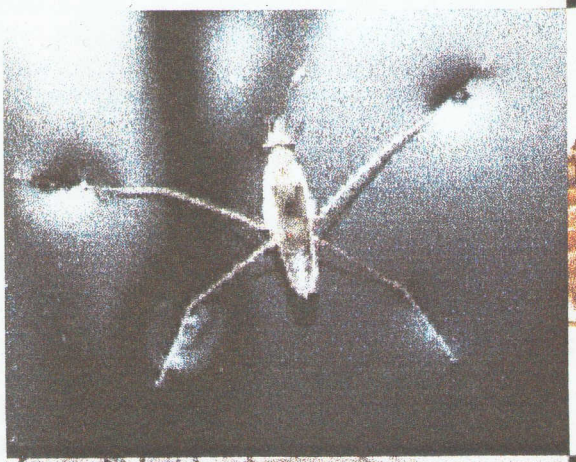
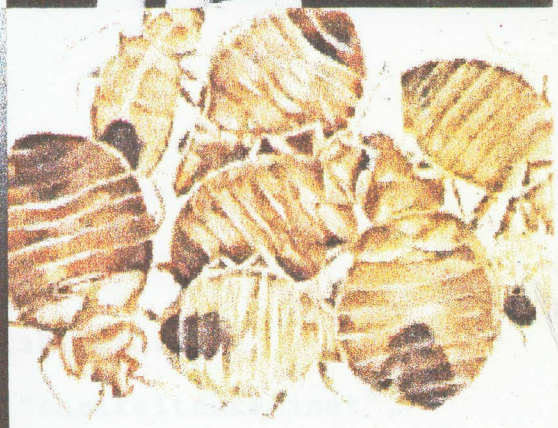
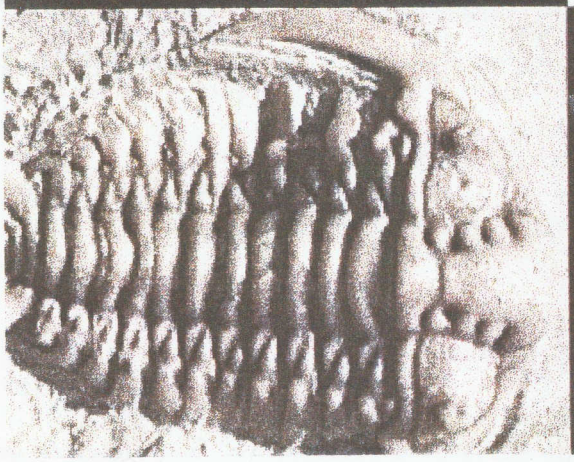
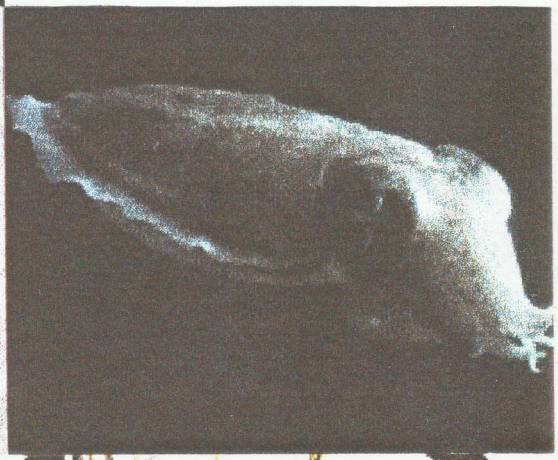
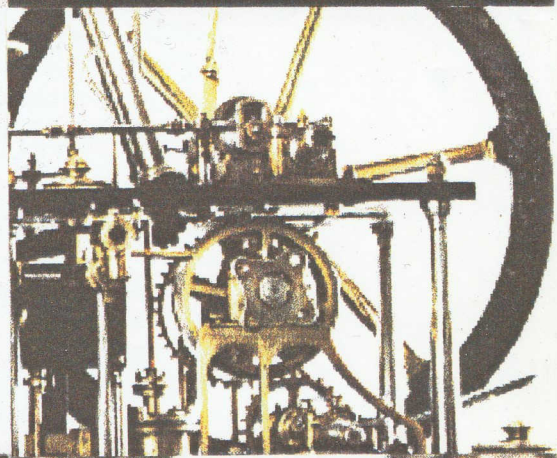












POSTAGE

PROJECT "RARITEITENKABINET"

CONTENTS

Historical introduction to the "rariteitenkabinet".

Analysis of the components required in the "rariteitenkabinet", and the component combinations possible.

Description of the components

Design brief

Brief history of electronics

Bibliography

The seventeent century was truely the "golden age" for the Dutch.The Netherlands had access to many trade routes and companies like the VOC and later the WIC exploited their own.In their wake came not only just material wealth,but the expansion of ideas and the thirst for even more.

"Rariteitenkabinetten" were a characteristic segment of the Dutch culture.The urban elite and the more affluent middle class,had the means and were in the intellectual climate,for collecting.Uncannily enough there has been little attention for that phenomenon since then,and three reasons can probably explain this.

1- collection

Not a single seventeenth century has remained intact.Not just in the literal sense of the inadequacies of the preservation techniques.More often then not,a collection was auctioned after the demise of the collector.A collection was also quite fluid;new specimens would be acquired,while others would be sold.This exchange meant that sections of a collection might easily become the foundations of a new one.

2-

In the seventeenth century one could still have the illusion of "homo universalis".The world and its secrets seemed within reach and one could think that his collection formed a representative part of that world. That illusion was thwarted in the eighteenth century. There was simply too much information becoming available,this led to an increasing specialisation,and so ended the concept of a "rariteitenkabinet".

3-

The literal translation of the word "rariteitenkabinet" is "rarity cabinet",though the dictionary translation is "freak museum".The same tendency could be seen in the Dutch word "rariteit",meaning at first something that was quite rare,from there it evolved to something "unusual"or "out of the ordinary".The present day association with the word "rariteitenkabinet" is more the exhibition of the bizarre.

Even the word "kabinet" has evolved.First it meant the furniture used to house the collection,then it meant the room in which the collection was housed,and finally it meant the collection itself.

Contents and order in the collection were dependant on the motives for collecting.Five motives for collecting can be assumed,either independantly or in differing compositions.These motives are status, investment,religion,aesthetics,and scientific curiosity.

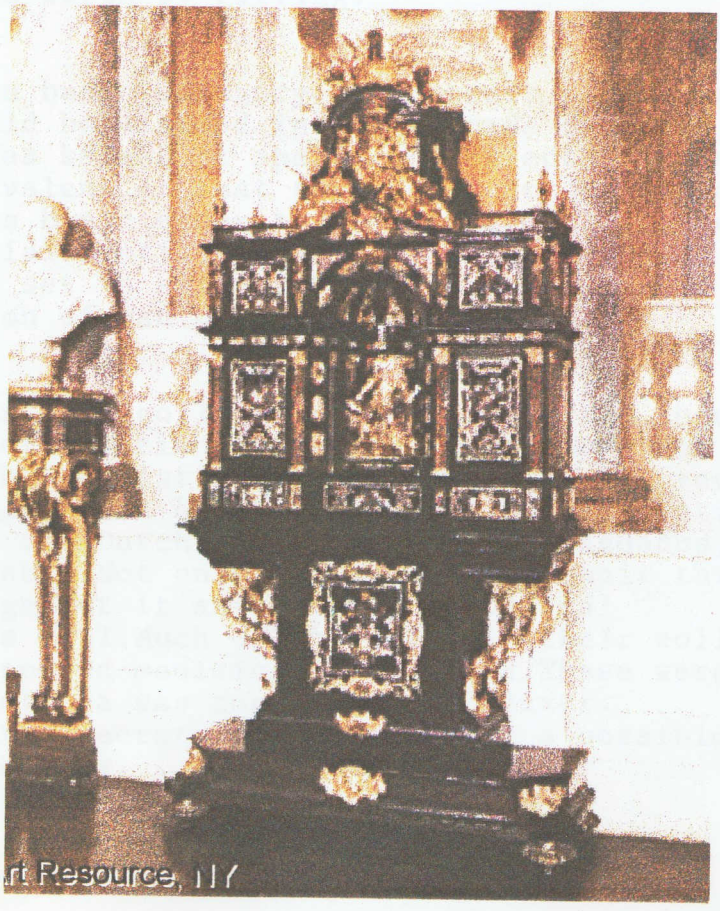
The collector could,because of his collection,come into contacts with others that would normally be out of his reach.Chemists and merchants would not only be visited by professors and princes,but could even become acquainted with a czar.In 1711 for instance,Peter the Great visited the numismatic collection of Jacob de Wilde,and other collectors like Levinus Vincent could note a visit by the king of Prussia.

Investment was definately a motive for a collecting dealer like Nicolaas Chevalier.The Amsterdam chemist Albertus Seba also realised investment potential. On the whole,it must be said that investment in "rariteiten" was risky.Other investment opportunities offered a greater return.Many collections were sold far beneath the expected price.The acquisition of "rariteiten" was still quite difficult,so the most significant reason for selling a part of a collection was to raise the quality of that collection.

Aesthetic appreciation definately played a role in collecting.Shells,birds of paradise,and corals,had a singular attraction because of their form or colour,and in the presentation of a collection there could also be an aesthetic appreciation.In the collecting of paintings,engravings,and drawings,the easthetic experience was of a different nature,and how they interacted is as intrigueing as it is complex.

The religious motive was an important aspect in natural history collections.This must be seen in the light of pre Darwinism.All creatures were created by God,and the book of nature should be read and understood as well as the bible.Collectors like Levinus Vincent and Albertus Seba repeatedly exclaimed at the wonder of Gods creations and said that their collection had inspired many to "acknowledgement of the allmighty".

Bridgeman Art Library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The most important motive for collecting is most likely scientific curiosity.The enigma of the unknown still poses a mesmerizing attraction,little wonder of the seventeenth century reaction.Many collectors had contacts with the university community and the collections of those like Frederick Ruysch and Jan Swammerdam supported the educational research.This is more the case of British collections,the most noteworthy being that of Hans Sloane.His collection became the center of the British Museum,and that of Elias Ashmore and Robert Sibbald came into possession of Oxford and Edinburgh.

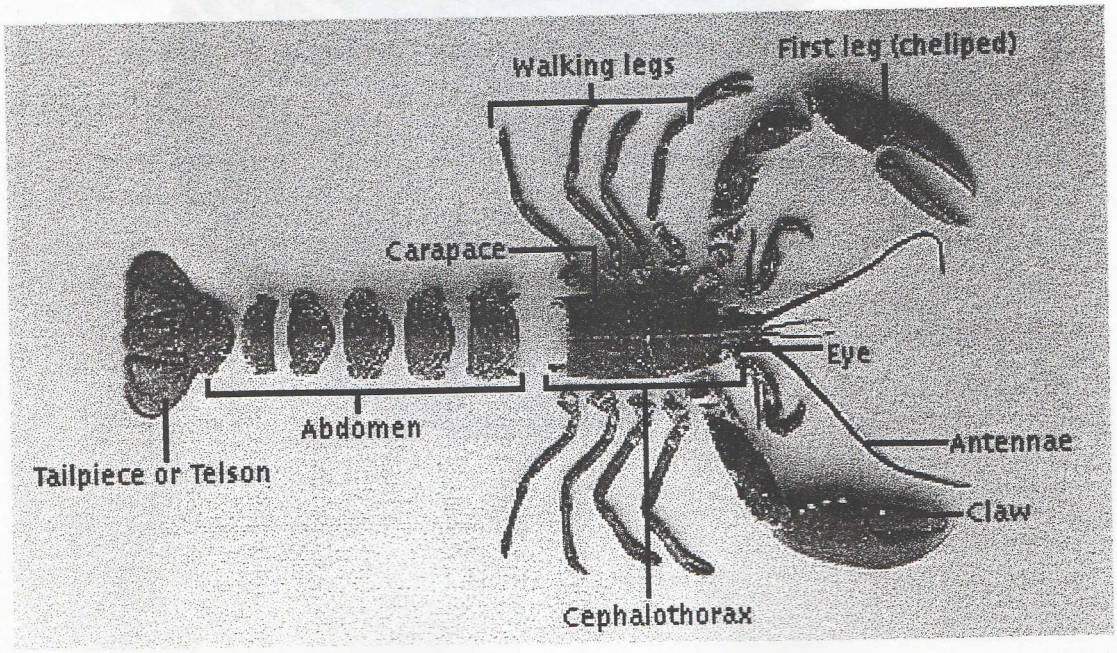
Simon de Vries gave us some insight into the contents of a"rariteitenkabinet".In 1682 he defined four catagories of contents.In all he emphasizes the natural history aspect.The first was that which is rare.The second is that which is not necessarily rare but is not native to Europe.This was usually something from the tropics,everything from a seahorse to a komodo dragon.The third catagory was that which was neither rare nor exotic but which had an idiosyncrasy which made it very special.Anatomical anomalies, such as the six sided egg that was discovered in 1659, fall under this catagory.The forth catagory is about an ordinary product of nature which through human hands has been made special.Whale tooth and elephants tusk were quite common at the time,but they were given an indelible worth by carving.

Still,a more basic catagory of contents can be made. Objects could be divided into that made by human hands,such as kayaks or spears,and objects from nature;equivalent at that time to creations of God. Even to this basic order there were anomalies.The quintessential nautilus shell,for instance,is exquisitely set in silver,then to what degree is it a creation of man or a creation of God.

The contents of a collection were,more often then not,in direct relation to the profession of the collector.The chemist Ferrante Imperato had a very renowned collection housed in Naples.His collection, and that of the Dutch doctor Bernardus Paladanus, were comparable.Not only did it satisfy their thirst for knowledge but it satisfied professional curiosity as well.Much of the items in their collect-ions had supposed medicinal properties.These were the days that tea was considered an elixer. Unraveling the secrets of nature meant a possible cure for diseases.

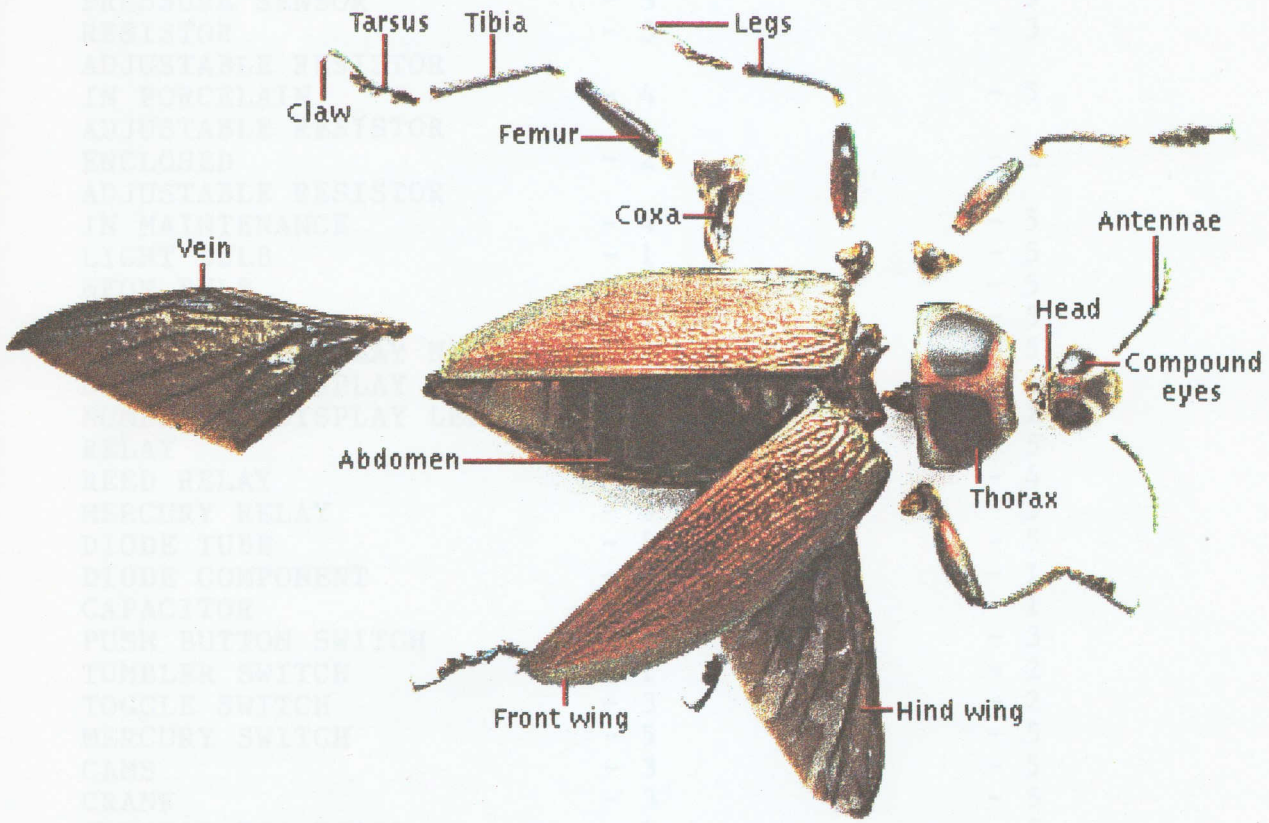
Realising the historical implications of the "rariteitenkabinet" gives me the opportunity to disregard them.The concept in itself has been outdated since the eighteenth century;no space can hold the Fountain of Knowledge.However the encyclopedic version of a "rariteitenkabinet"has survived.This was a collection on all the aspects of the world,done on paper.In such a collection the idea of the universe within reach was symbolised by the globes of the earth and the heavens.

This project can advance in several differing directions,but these can also intermingle.Firstly, in realisation of the fact that the "rariteitenkabinet" has survived in a much more specialised version,a "rariteitenkabinet"through the esoteric.That can be explained in different ways.Esoteric in the meaning of vastly specialised,the "rariteitenkabinet"would then have a very specific target group,or esoteric in the sense of the enigma experienced by the unversed.The last is quite interesting in that it is a repercussion of earlier motives for a "rariteitenkabinet",those motives given by Simon de Vries.The world is so much specialized nowadays,that one totally versed in one field,could be totally ignorant in another.Thus the unknown fields paraphernalia has the attraction of the esoteric. The basis of this is the natural curiosity of most people,and therefore a tool that can be used to great effect.The second direction that this project can take,is the "rariteitenkabinet"in its most mediocre version of a general purpose storage facility.The emphasis being not on the "rariteitenkabinet" itself but on the objects stored within. The third direction that this project can take,and definately the direction I find most appealing,is the "rariteitenkabinet"as a symbol of knowledge.In the same manner as the earth and constellation globes were a symbol of the seventeenth century encyclopedias. This gives the paradoxical opportunity to design the "rariteitenkabinet"as a symbol of itself.



As the function of the "rariteitenkabinet" is to arouse interest,among other things,light and movement will be utilated to attain that.Transparency is also important, considering the educational aspect of the "rariteitenkabinet", Not only of the full form but also of the parts within.We must also be very aware of the semantics of the individual parts,if their form says something about its function and how it works.An example of this is the difference between a micro switch and a mercury switch.The micro switch is literally a black box;its geometric exterior says very little, the mercury switch on the other hand is quintessential when it comes to a "rariteitenkabinet".Most metals float in it(the mercury relay uses this characteristic) and the fact that its a liquid makes it quite versatile in electronics.Its strong cohesion is another welcome property.Salty water would conduct just as well as mercury,but it has a high adhesion,thus rendering it useless.We can also look at mercury in a different manner,people do not comprehend a liquid metal at room temperature.

The mechanical parts that make movement possible should be viewed in the same manner,do they show meaning in their function and form.Both a crank and a cam can be used.They can be powered directly by a motor,without any special demands on that motor.


Tarsus
Tibia
Legs
Claw
Femur
Coxa
Antennae
Vein
Head
Compound eyes
Abdomen
Thorax
Front wing
Hind wing

The following parts can be considered as parts for a "rariteitenkabinet".They will be viewed in their sense of rarity and in their semantic sence,scaled from one to five, five being the highest degree of rarity or semantics.

	- RARITY	- SEMANTICS
LIGHT GATE	- 5	- 1
MAGNETIC GATE	- 4	- 3
LIGHT DEPENDANT RESISTOR	- 1	- 3
VOLT DEPENDANT RESISTOR	- 1	- 1
NTC RESISTOR	- 2	- 2
PTC RESISTOR	- 2	- 2
INFRA RED SENSOR	- 1	- 2
PROXIMITY SENSOR	- 1	- 1
THERMISTOR	- 3	- 5
PRESSURE SENSOR	- 3	- 5
RESISTOR	- 3	- 3
ADJUSTABLE RESISTOR IN PORCELAIN	- 4	- 5
ADJUSTABLE RESISTOR ENCLOSED	- 2	- 2
ADJUSTABLE RESISTOR IN MAINTENANCE	- 4	- 5
LIGHT BULB	- 1	- 5
NEON BULB	- 5	- 5
LED	- 1	- 5
NUMERICAL DISPLAY NEON	- 5	- 5
NUMERICAL DISPLAY LCD	- 1	- 1
NUMERICAL DISPLAY LED	- 1	- 1
RELAY	- 3	- 5
REED RELAY	- 2	- 4
MERCURY RELAY	- 5	- 5
DIODE TUBE	- 5	- 5
DIODE COMPONENT	- 2	- 1
CAPACITOR	- 2	- 1
PUSH BUTTON SWITCH	- 1	- 3
TUMBLER SWITCH	- 1	- 2
TOGGLE SWITCH	- 3	- 2
MERCURY SWITCH	- 5	- 5
CAMS	- 3	- 5
CRANK	- 3	- 5
CIRCUIT VIA BOARD	- 1	- 5
CIRCUIT VIA METAL WEB	- 5	- 5
CIRCUIT VIA INSULATED WIRE,COLOURED	- 1	- 5
GEOMETRIC FORM	- 1	- 3
ZOOMORPHIC FORM	- 5	- 5

NOTE : Rarity is not in the sence of it being rare or no longer manufactured,but in the sence of it being unusual or not often seen.

The parts can also be divided into low current electronic components and high current components.If they need a resistor an R will be placed behind it.A * will be placed if it works on that particular current,a - will be placed if not.

	LOW CURRENT	HIGH CURRENT
LIGHT GATE	* R	* R
MAGNETIC GATE	*	*
LIGHT DEPENDANT RESISTOR	* R	* R
VOLT DEPENDANT RESISTOR	*	*
NTC RESISTOR	*	*
PTC RESISTOR	*	*
INFRA RED SENSOR	* R	* R
PROXIMITY SENSOR	-	* R
THERMISTOR	*	-
PRESSURE SENSOR	-	-
RESISTOR	*	*
ADJUSTABLE RESISTOR	*	*
LIGHT BULB	*	*
NEON BULB	-	* R
LED	* R	* R
NUMERICAL DISPLAY NEON	-	* R
NUMERICAL DISPLAY LCD	* R	* R
NUMERICAL DISPLAY LED	* R	* R
RELAY	*	* R
REED RELAY	*	* R
MERCURY RELAY	*	* R
DIODE TUBE	*	* R
DIODE COMPONENT	*	* R
CAPACITOR	*	* R
PUSH BUTTON SWITCH	*	*
TUMBLER SWITCH	*	*
TOGGLE SWITCH	*	*
MERCURY SWITCH	*	*
CAMS	-	-
CRANK	-	-
CIRCUIT VIA BOARD	*	-
CIRCUIT VIA METAL WEB	*	*
CIRCUIT VIA INSULATED WIRE?COLOURED	*	*
GEOMETRIC FORM	-	-
ZOOMORPHIC FORM	-	-

NOTE : By low current I mean a voltage lower than 10,by high voltage everything higher.In the case of electronic circuits "higher" is usually 230 volts,as voltages between the low current criteria and 230 are not common.230 volt is the new European standard,though 220 electronics need no adjustment to it.(Mains voltage has considerable fluctuations)

A number of part combinations can be made.If we keep in mind that the goal is light and movement to facinate,plus to educate,or at least elucidation as to how it works.The goals therefore are best achieved by the limited use of parts.

1 Light gate,Mercury Switch,Numerical Display Tube.

2 Light Gate,Mercury Switch,Neon Bulb.

3 Light Gate,Neon Bulbs.

4 Light Gate,Light Bulb.

5 Light Gate,LED.

6 Magnetic Gate,Numerical Display Tube.

7 Magnetic Gate,Neon Bulb.

8 Magnetic Gate,Light Bulb.

9 Magnetic Gate,LED.

10 Cams,Zoomorphic,Mercury Switches,Neon Bulb.

11 Cams,Zoomorphic,Mercury Switches,LED,

12 Cams,Zoomorphic,Mercury Switches,Light Bulb.

12 Cams,Geometric,Mercury Switches,Neon Bulbs.

13 Cams,Geometric,Mercury Switches,LED.

14 Magnetic Gate,Relay,Neon Bulbs.

It becomes apparent that literally hundreds of combinations are possible.These combinations can then be viewed with the results of the result in rarity and semantic degrees.If for example I take combination 10,Cams,Zoomorphic,Mercury Switches, Neon Bulb,and add their rarity and semantic degrees.I have a number by which to compare with others.5+5,1+5,the result is 11.Of coarse the cams and zoomorphic don't appear in this equation but that can be accounted for by by using the average degree per component.Then it wont matter if the combination comprises of four components or fifteen.

A number of the myriad of combinations can be seen as most likely to succeed,either because of their simplicity or the degree in semantic and rarity sense.

1 - Light Gate,Neon Bulb.

On the R and S scale they score 5+1,5+5,the average being 8, but more components are needed for its functioning.With a neon bulb a resistor is always needed.This would make the average 7.3.The light gate is very pliable in form,as it is only a device that reacts upon changes in light intensity.

2 - Light Gate,Neon Bulb,Cams,Zoomorphic.

On the R and S scale they average at 8.5.The motion to drive the cams could be the same as the drive of the light gate.Or different as the case may be.It should be noted that by a zoomorphic form I mean that the "rariteitenkabinet" isn't stationary,it is in motion by an external drive,protrusions that cause the motion.

3 - Magnetic Gate,Numerical Display Neon,Geometric.

On the R and S scale this combination scores 7.It should be noted that by geometric I mean a form that is in itself stationary.It has no external drive protrusions.The motion is within the form.

4 - Magnetic Gate,Numerical Display Neon,Cams,Zoomorphic.

The R and S scale shows an average of 7.5.With a zoomorphic form it is quite easy to introduce mercury switches as they would react to the difference in elevation and angle.That would bring the average up to about 8.

5 - Cams,Mercury Switches,Neon Bulb,Geometric.

The average on the R and S scale is 8.An aspect that is in favour of such a combination is its simplicity.An aspect that must not be forgotten.

6 - Cams,Mercury Switches,Neon Bulbs,Zoomorphic.

R and S scale average is 9.5.I have only listed cams in these combinations but they can easily be replaced by cranks. Both these give an intermittent motion via a continuous motion.In using this option, I avoid having to use a servo-mechanism which requires significantly more,complicated, electronics.Above all,using cams is congruent to the goal in mind.

7 - LDR,Cams,Mercury Switches,Neon Bulbs,Zoomorphic.

The average for these components is 8.4.The only difference with the former being the LDR.Although this component doesn't score very high on the R and s scale,it makes the product aware of its surroundings.

All the component combinations can have extra components added to them.VDR's,thermistors,external adjustable resistors,external switches,and the components can be joined by circuit board.circuit mesh,or insulated wires.

SWITCH - a device which opens or closes an electric circuit. In its most simple form it consists of two conductive materials,one of which is mobile.We can differentiate between turn switches,tumbler switches,and push-button switches.The design of a switch depends on the voltage it has to carry.A higher voltage needs more insulation and if possible arc-forming must be avoided,as it might weld contacts.

RELAY - a switch which can by a current change in its circuit,open or close another circuit.Mostly it consists of a spool of wire and a soft iron core.If a current passes through the wire it magnetizes the iron core,this in turn is the switch which opens or closes the second circuit. Relay switches are quite versatile in that a low voltage current can controle a high voltage current.

THERMOSTAT - a device which by temperature change in its environment,opens or closes an electric circuit.The most common form is the bimetallic strip.Due to the different expansion rates of the two metals,the strip deforms as a consequence of temperature change.By that deformation it can open or close an electric circuit.Another form is the mercury thermostat.The expansion of mercury in a glass tube can join cathode to anode.A digression on the thermostat might be the PTC and NTC resistors.They change resistance more than exponentially as a result of temperature change.

BAROMETER - a device for measuring air pressure.It consists of a mercury column or in the cheaper and more versatile version as the metal-box barometer.The latter consists of a metal box with a partial vacuum inside.Air pressure on the corrugated exterior causes the box to distort ant this change can be shown on a scale or transferred to paper.

DIODE - an electronic element that only lets a current pass in one direction

LED - a light emitting diode is as the name suggests a diode that emits light.The colour of a led depends not on the colour of the plastic its embedded in,but on the semi-conductor its composed of.Leds can only emit the colours red,yellow,green,and the invisible infra red.Blue leds are rare and expensive due to the manufacturing process.

LDR - a light dependant resistor,is as its name suggests, a resistance dependant on the light it receives.This can vary from 75 ohm to about 10 mohm.

LIGHT GATE - a light gate consists of two seperate parts, a sender and a receiver.The sender can be a lamp or a simple led,the receiver is,more often than not,an LDR.The gate can be opened or closed by simply breaking the beam of light.

INFRA-RED MOVEMENT DETECTOR - a detector which works with infra-red.It registers the temperature of animate or inanimate objects in its surroundings.In first instance it would react to nearly everything were it not for the Fresnel lens over the sensor.The Fresnel lens changes its properties from a temperature change detector to a movement detector.

PROXIMITY SWITCH - a switch which registers an object in its proximity

NEON LAMP - a neon lamp uses an inert gas,either neon or helium.The discharge of energy results in ions that light up,this is what gives neon its dim light.If helium is used in the lamp the light is yellowish,if neon is used,the colour is reddish.There is also green neon light,but lamps are not yet mass produced and work on a different principle.

REED RELAY - a very small relay which consists of a glass tube with two wires,these wires make contact if a magnet is placed in vicinity.

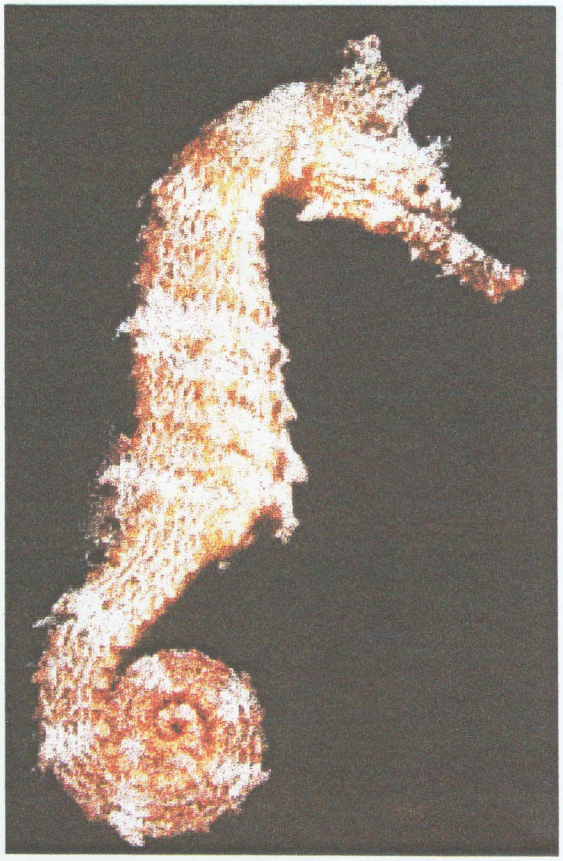
CIRCUIT BOARD - a board made of non-conductive material,on which circuit components can be soldered.On this circuit board a print for a particular purpose might be engraved by chemical means,or a hobby printed circuit board with copper "islands"is used.A circuit board is mostly used for low voltage electronics(up to about fifteen volts)so in combination with a circuit board a transformer must always be used.

TRANSFORMER - an electric device making use of the principle of mutual induction to convert variations of current in a primary circuit into variations in a secondary circuit.It can therefore only be used for alternating current.

NUMERICAL DISPLAY TUBE - a tube filled with neon or another inert gas.The numbers are made of the same material as a normal light bulb and the combination of the two lights up a number.Each number has a seperate anode and cathode, so they are independantly attached to a circuit.

MAGNETIC GATE - a theoretical switch,working on the principle that a magnet can influence a reed relay and cause a current to pass through a circuit.

RESISTOR - a component that serves to lessen the voltage passing through a circuit.



1 THE NEW PRODUCT

1.1 Short indication of the product.
The product is a symbol for the will for understanding.A container for that will with as the tangible symbol mechanism and electronics.Its goal is to inspire facination, cossequently to nurture the curiosity present in most of us.

1.2 The main reasons for developing the new product.
It is a reaction against the increasing information abstraction.The manner in which information is brought to us has no semantic relation to the information given.For instance the information storage on the cd has little relation to music orfilm the way that a vinyl record or movie film does.The information medium has no congruence to the information itself.

1.3 Description of the companies product range and how the new product has to fit in.
As yet there is no company likely to manufacture this in its totality.This is typically a product that is assembled by a design company batch by batch.Parts are ordered from different companies and if the need arises they will be assembled.

1.4 Existing products to be replaced by the new product.
In the eighties there was a fad in kinetic objects.These objects,mass produced and accordingly designed,sought to show the principles of physics in a desk top doodle.This product is a digression on that concept but its quasi-intellectual matrix elevates it above that.

2 marketing

2.1 Description of markets or market segments.
The market is essentially affluent western Europe.especially countries like The Netherlands,Denmark,and Germany.Germany is a good example,it is the country with the highest BNP per head,highly developed "top end" industries and will to understand.The rariteitenkabinet will be expensive and they can afford it.

2.2 The distinguishing marks/data of these markets and segments.
The market is neoteric and therefore difficult to grasp.It can be said though that the market has a certain arrogance.It could be said that the will for understanding is often accompanied by the will to distance themselves from the ruck of mankind.

2.3 The target group or buyers.
The target group is somewhere between managers and scientists. They've had university or certainly a good college education and are earning very well.They have gone through the Ikea phase and now seek solace in the design shop,and thats where they'll find the "rariteitenkabinet".An aspect of going into the design shop for a complete overhaul of their interior,is that they want to say something with it.If they didn't then Ikea would have sufficed.

2.4 Consultants advising the buyers.
Every shop has its idiosyncrasies and design shop mentality is geared to that.The retailer selling the product will be viewing the "rariteitenkabinet" in the same way as his/her customers.It will be a curiosity even in a design shop, definately something that catches the eye and will raise questions.The entrepreneur will be quick to exploit that. His own facination will be the best way of selling the product.

2.5 Market demands concerning normalisation,official regulations,safety rules,etc.
The safety regulation for industrial products and art differ.This product will be sold as industrial design and the more stringent safety regulations apply.Double insulation therefore and if mercury is used in the components safety aspects will be incorperated in the design;it will be doubly enclosed.

2.6 Available market or product investigations.
There are no rapports or publications for this concept.This product is in unexplored terrain.

2.7 In which phase is the market.
As the market is neoteric it can only grow.

2.8,2.9 Competitors,the main competitive products.
The product has no real competition,but the lava lamp is the type of product it's vying with.Of apocryphal function,the lava lamp is another product that facinates.

3 NUMBERS AND PRICES

3.1 Indication of the planned number of products to be sold and produced.
I expect to be able to sell 500 products in the first year and more in the years that follow due to concept change or concept diversification.The cost of the product will be between 300 and 500 guilders.This may seem a wide margin but quite a lot depends on the parts used in the product.For instance the drive motor that can be used can be alternating current,direct current and can function at different voltages.That doesn't really have grave consequences for the price but whats important is the gearing mechanism behind the motor.Motors work at a certain speed,this is because of the law of Lorentz,it needs to be strong enough to drive the motor into the next phase of empowerment,also the subsequent phases need to be one continuous motion.That is attained by a certain speed,below that speed and the motor simply doesn't work.I need a rythmic motion for the "rariteitenkabinet".Otherwise the motion might be considered irritant.The most durable way of ding this is via cogs but these are relatively expensive.An alternative would be drive belts or rollers.The first of the alternatives is a little less durable and the latter is technically demanding.Prices vary for each solution.

3.2 Indication of cost price,margins,sales price.
The retail price per product is between 300 and 500 guilders. Half of this is profit for the various concerned factions. The electronic components aren't too expensive due to the number of suppliers.The mechanical parts that have to be specifically manufactured can be done so at certain companies. Van Mierlo BV Baak is a company specialised in mass producing metal parts via turning and milling.They have a wide variety of cnc machines at their disposal and therefore if more supplies of parts are needed they can quickly fulfil that demand.The rest of the profit is divided between the design company assembling the product,and designing it, and the design shop selling the product.

4 FUNCTIONS AND USE

4.1 What does the product make possible for people using it.
The products primary function is that it allows them the comfort of intelligence.Society demands a good education,in effect it demands intelligence.People react and adapt to that,they start demanding a good intelligence and education from themselves.They become widely orientated but never have enough time for their interests.They glance through the book at the bookstore,buy it,but never find time to read it.The books cover is the comfort that they at least have access to information.It is proof to themselves and others that they at least want to know what's inside the cover.The anachronism of "homo universalis" therefore has its symbol,only I am designing a product for it.Especially as information has increasingly disappeared into the cd-rom disc.
The secondary function is that it is a catalyst for conversation,and perhaps also a status symbol.The product is a desk top object and I imagine that a friend of the owner sees it, is drawn to it,inevitably asks questions,the owner proudly explains the intellectual matrix,has an ego boost,and the friend,not wishing to do under,buys himself one too.

4.2 Who are using the product.
The product is male orientated,and is bought and used by them. As I've said earlier,they've had a good education,have the money and buy it.That is the target group I am aiming for but I am sure that other groups will be attracted to the product.

4.3 How the product is used.
The product doesn't need to be operated,it operates itself for the most part.If external switches,adjustable resistor knobs or an independant input device are needed,the users will have little problem with them.If the product is "shown off" then the owner will be operating it with the bystander close by.

4.4 Where is the product being used.
The product is a desk top object.Not only as it is visually orientated,and I want to bring it closer to eye level,but also because if it was placed on ground level,the product would fall in stature.It is in a study or a place of work, indoors,in the room where a computer can also be found.In this sense it is vying for space with the computer,monitor, mouse and pad and the cd rom cassettes and floppy disk cases. This doesn't mean that I will make any attempt to make it fit in with the other objects,as a symbol of itself it needs to be an idiosyncrasy.Especially if external protrusions are used it will gain much more "breathing space"then the other objects.The other objects do have consequences for the size of the "rariteitenkabinet" though.Its dimensions will be in the order of 30 by 20 by 20 cm.I am not saying that the product is used on the same table as the computer,merely that a computer is close by.

4.5 Descriptions of possible situations that the product is not actively in use,In stock or stand by.
The product remains on its table top when not in use.It is then merely turned off.In its operation it does not have to be foldable or stackable but some solution will have to be found when in transportation if outside protrusions are used.As mains electricity is used the plug will be pulled out if not in use for extended periods of time.

4.6 Safety (regulations)
As it is an electronic product,every attempt will be made for safety.It will be doubly insulated,any sharp edges on outside protrusions will be removed.An aspect that must definately not be forgotten is that mercury is a poisonous metal,steps will be taken to ensure that if any leak may occur that it can be safely disposed of in the chemical disposal box.As the mechanism and the electronics will most likely be housed in a transparent plastic case,there is little danger there.

4.7 Damage etc.
The environment that the "rariteitenkabinet" is housed in,is in only way damaging,that dust,debris,cigarette smoke and sunlight can cause problems.Dust tends to settle on all components in an electrical device.In electronics with a lot of heat this causes a particular smell.In the case of the "rariteitenkabinet" dust most not be allowed to settle on the internal components as it would make it a lot less appealing. A closed atmosphere must be created and the case must be able to be opened if repairs or adjustments are made,also for if one of the eventual mercury switches may rupture.This is in complete allignment with the demand for double insulation.

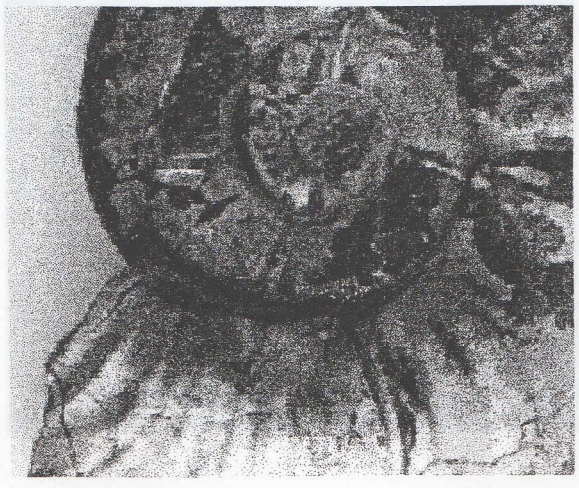
4.8 Negative circumstances.
Dust,smoke,and sunlight may be damaging to the transparent body shell,so the best plastic will be found for this.If external protrusions in conjunction with a drive cam is used, then pads will have to be incorperated to ensure that these protrusions do not damage the table.Another function of those pads is that they will stop the "rariteitenkabinet" from possibly falling off the table.The rythmic motion through drive cams,magnetic gate,or light gate might lead to a linear movement of the complete product.

4.9 Physical life span.
The physical life span of the product depends on the motor. Most motors,depending on how much strain is put on them,can work continually for several years.The life span is shortened if strain is put on the motor axis in axial direction,this must be avoided.Life spans of neon light bulbs are indefinate. They work for decades.Leds are much more susceptible.Resistors are quite resilient as are most of the other components.

5 SEMANTICS

5.1 Sentiments and expectations of buyers and users.
The buyers will expect something seemingly complicated but if they study the product in more detail they will discover the simplicity behind the facination.In the "rariteitenkabinet" of its era biology was an important aspect.The forms that were brought to the attention of the collector were therefore zoomorphic.Art was also housed in the collection and exotic implements but on the whole nature was the majority of the collection.Confronted with the word "rariteitenkabinet" they are expecting something bizarre.The trick for the designer will be to fuse the electronics,semantics of the parts within into a coherent,congruent whole.What do the electronics say? How do I combine movement with the accompanying light?These are the vitally important questions concerning semantics.
On one hand I have the machine parts which demand a certain form aesthetic and on the other hand is the demand for zoomorphic idiosyncrasy.Also the introduction into electronics is important.

5.2 Atmosphere of the product,semantics of the design.
The "rariteitenkabinet" is a mass of contradictions.On one side there is the machine part that asks for a cold,hard design, and on the other is the electronics that are quite complicated and there is also the zoomorphic exterior.There is a pervading tendency in electronics to display.This can be seen in the electronic magazines,and the way components are sold.An important example of this is the relay which invariably has a transparent shell.This is done so that the soldering of contacts is done correctly,there is simultaneously a visual feedback of the soldering and the web of wires.That tendency can be used to the advantage of the "rariteitenkabinet".The same thing might be said for mechanisms.Often when the latest model of a certain car manufacturer is exhibited,there is often a cross-section view of the cams,valves,pistons,and the crank shaft.The car is a male extension and the workers are proud of it.In an overall sense the "rariteitenkabinet" will be considered complex,but this has more to do with the addition of electronics to the mechanical then that the product is really complicated.



6 DESIGN

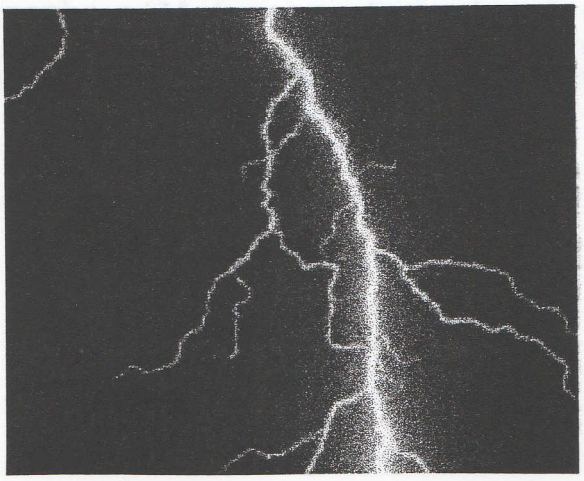
6.1 The corperate identity involved.
There is no corperate identity involved,in fact it would be a contradiction if there was.

6.2 Design style.
The design style will follow itself.I do have a say in the design as I have been known to be influenced by the form solutions in nature before.The product will have a very characteristic form in keeping to its concept that is the design style required.

6.3 Styling and design.
Superficially the design might be called revival.Though it is more that I am using the parts because of their direct visual feedback.The parts themeselves are "rariteiten" not because they are no longer manufactured,as an industrial designer I want to use the parts that enable mass production,it is that the parts become anomalies.In electronics the tendency towards miniaturisation has reduced parts to abstraction.The very fact that I am specifically using parts for their visual feedback proves the science behind the facination.Again the congruety to the goal "rariteitenkabinet" as a symbol of itself.

6.4 Form tradition of the product.
As the concept is so very new there is little question of breaking or continueing form tradition.The kinetic objects that were based on the similar concept were made of chromed steel and had a cilindrical foot that housed the electronics. It has little to do with this concept in that the electronics were literally hidden away in a black,plastic box.

6.5 Policy regarding colour and texture.
There is no corperate design policy towards colour and texture, but I will certainly be exploring the various possibilities in the metal parts,the use of colour will be quite minimal, resistors and the other electronic components will be chosen on the basis of their colour.These components give the colour and I will manipulate it to the desired effect.



7 SALES

7.1 Sales organisation.Distribution channels.
The product is sold to the design shop via direct contact with the designing company and it will be sold directly in the design shop.Either as in a complete interior overhaul or as an individual purchase.

7.2 Communication with the market and customers,via word of mouth is always the best solution.Most of the information concerning the "rariteitenkabinet" will be done this way but additional information written,is probably required.That will be given when the product is sold.The "rariteitenkabinet" could easily be denoted a figure-head for the design company responsible for its design and assembly.It is therefore very required that the product is publicized.Attempt must be made to have it publicized in the various design and industrial design magazines.To have it on the cover of a magazine for the science of industrial design,is endemic to the "rariteitenkabinet".

7.3 Decision procedures
The price decides the decision making time for buying,and it is the same for the "rariteitenkabinet".Certain people will fall for it and buy it immidiately,but most will think twice before doing so.

7.4 Possibilities for unique selling points
The unique aspect of the "rariteitenkabinet" is that it places a symbol within a quasi intellectual matrix.As it is a symbol for intelligence,it will be seen as to reflect intelligence.On a different level the product could be deemed as on the thin line between art and industrial design. Sometimes that is seen as incompatible but simultaneously it gives the product a certain uniqueness.The function as a lure to science will appease the more conservative industrial designers,as they view industrial design as a science.The product will be sold because of its difference to the other objects in a certain environment,again totally endemic to a "rariteitenkabinet".

7.5 Commercial backup and product promotion.
As stated in 7.2,the product needs to reach the design magazines.Photographs will have to be made of the finished product and sent along with an explanation leaflet,to the various design magazines.Once there the product will have to do the rest.

8 PRODUCTION

8.1 Who will be manufacturing the product.
As stated before,the assembly of the different components will take place at the design company.This reduces profit loss for the company and demands can be easily met.The product will be designed in such a way that the assembly is relatively unskilled.or to be more precise that the assembly is not too difficult.Assembly will require no more than a few pliers,a soldering iron,and a screwdriver.Again, demand can be easily met.

8.2 Investment in production,logistics,transport,etc.
Moulds will have to be manufactured for the transparent body shell and perhaps a stamping press employed if parts need to be pressed.That will require a specifically machined part.This aspect of the design process will be explored in more detail later.

8.3 Which service industries could be involved in the development.
None

8.4 Description of parts to be used in the product.
The electronic components can be bought in bulk and used when neccesary.This could include the electric motor,resistors and adjustable resistors,leds,neon bulbs,switches,both external and internal,relays,transformers,plug,electric cable,proximity switches,LDR,VDR,NTC,or PTC,micro switches,rectifiers and possibly even diodes.Definately not all of these components will be used together,it depends on the component combinations. These components will be joined either by wire mesh,circuit board,or simply insulated wires.Circuit board can be designed and manufactured elsewhere and the techniques there make it possible to print a circuit board on a curved surface,this is usually done for miniaturisation but could be employed here. It is also possible to use "island" circuit board but the visual chain of lines that a circuit has,is then lost.A circuit board is only needed if a large number of components are used and this is not really the case with the product. A wire mesh or wire solution is also an option.
If external protrusions are used these will probably be manufactured of metal,either aluminium,steel,stainless steel, or in the case of parts where movement is concerned,bronze. The crank or cam shaft will have hardened parts,though a hard metal like stainless steel would certainly suffice.Most of the metal parts will be made of aluminium.An important aspect of the "rariteitenkabinet" is that it is honest concerning its constituents.Aluminium is the metal most suited for that purpose.The possibilities concerning texture will be explored but metal will stay metal.The metal components include cam shaft,gears,external protrusion,frame,and rods.
The body shell is composed of a transparent plastic,polycarbonate is an expensive but very durable material but the options in PVC or perspex are also feasible.Rubber pads will be used to prevent the "rariteitenkabinet" from scratching the table surface.

8.5 Logistic conditions.
Everything is coordinated by the design company,they will be responsible for the logistics as well.Transporting it to the various design retailers and so forth.The circuit of the components will be manufactured by the company in advance,as this is most time consuming,the other parts will be assembled if an order is placed.

8.6 Product and production quality.
The design company is responsible for production quality and quality control.They do this when the product is assembled.

9 DISTRIBUTION AND PACKAGING

9.1 Transportation facilities to wholesale traders,dealers consumers.
The product will be distributed by the distribution channels of the design company.Once at the design shop,the product will be distributed by them if the product is sold with other items and if it is sold seperately it will be no problem to take the product immidiately.If protrusions are used in the design then these will be removed in transportation to the design shop but assembled when the product reaches the design shop.

9.2 Special or standard packaging.
No special packaging will be designed for the product,it will be transported in an ordinary cardboard box and wrapped in foam.

9.3 Designing a special packaging while developing the product.
The product needs to be seen to be understood.Packaging in this instance is merely to ensure safe delivery.

10 SERVICE,SECOND LIFE AND RECYCLING

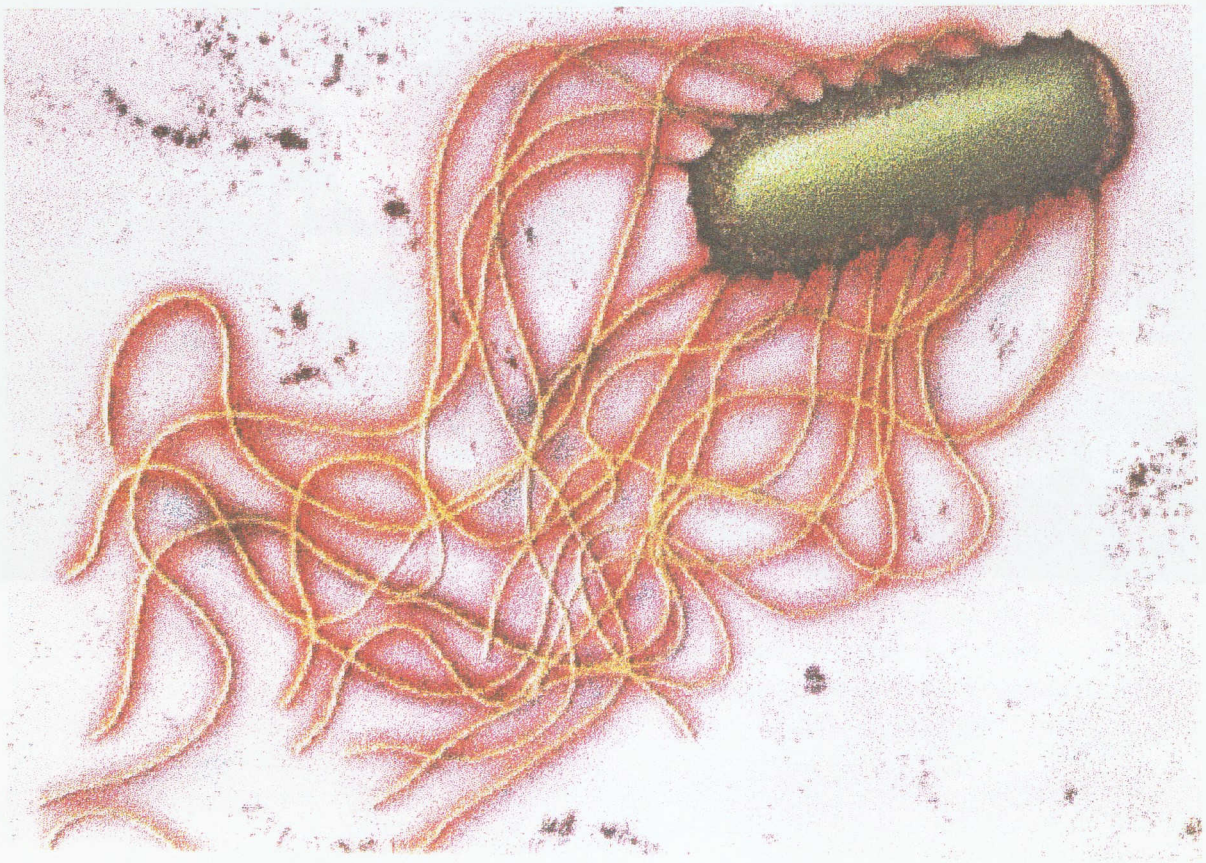
10.1 Cleaning the product.
The product will only accumilate dust and this can be easily removed by wiping it with a cloth.This will be done when the room that the "rariteitenkabinet" is in,is cleaned.As it will be designed with double insulation,there is little danger of dust settling on the inside or the components,though air exchange ducts will be incorperated,though designed that no dust can settle inside.

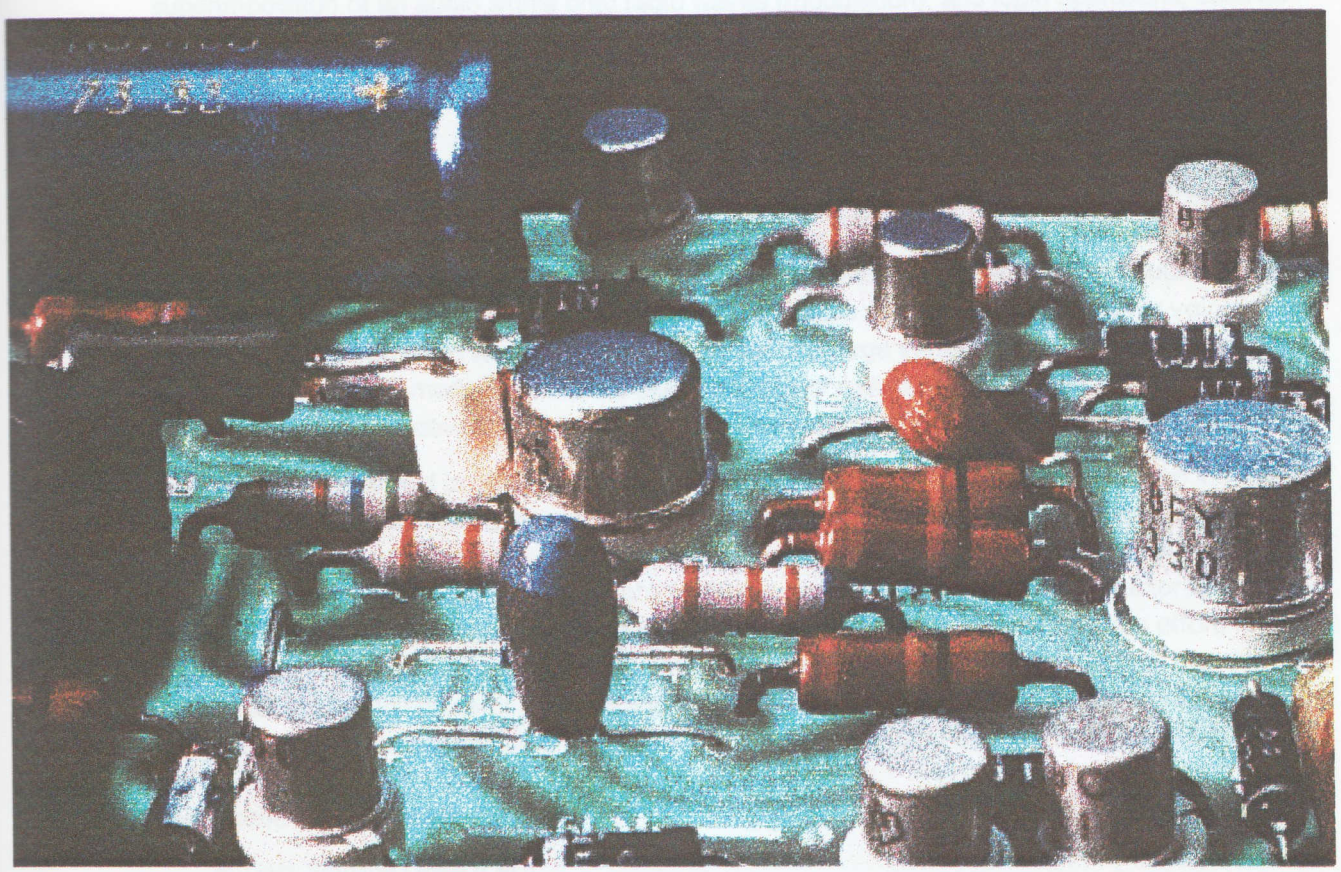
10.2 Service,maintenance,repairs.
The components used all have a high durability,and as such few repairs are expected,however the body shell is removable and any repair or replacement can take place.This is also needed if an eventual mercury switch should rupture.

10.3 Indication of the operational life span of the product.
The life span of the product depends wholely on the electric motor,all the other objects function much longer except if leds are used.The life span of the electric motor in use is round about a decade,the life span of the neon bulbs is much longer.

10.4 Environment

All the components can be easily seperated from each other,if the products life span has ended.This is not likely to happen though as it will be easy to replace the defect component.As stated earlier there will be an incorperation in the design in case an eventual mercury switch may rupture.PVC has an adverse effect on the environment if incinerated and this could be a reason to choose perspex or polycarbonate.In the leaflet accompanying the product this will be explained.





▣ Uses of Electronic Devices

Electronics, field of engineering and applied physics dealing with the design and application of devices, usually electronic circuits, the operation of which depends on the flow of electrons for the generation, transmission, reception, and storage of information. The information can consist of voice or music (audio signals) in a radio receiver, a picture on a television screen, or numbers and other data in a computer.

Electronic circuits provide different functions to process this information, including amplification of weak signals to a usable level; generation of radio waves; extraction of information, such as the recovery of an audio signal from a radio wave (demodulation); control, such as the superimposition of an audio signal onto radio waves (modulation); and logic operations, such as the electronic processes taking place in computers.

Historical Background

The introduction of vacuum tubes at the beginning of the 20th century was the starting point of the rapid growth of modern electronics. With vacuum tubes the manipulation of signals became possible, which could not be done with the early telegraph and telephone circuit or with the early transmitters using high-voltage sparks to create radio waves. For example, with vacuum tubes weak radio and audio signals could be amplified, and audio signals, such as music or voice, could be superimposed on radio waves. The development of a large variety of tubes designed for specialized functions made possible the swift progress of radio communication technology before World War II and the development of early computers during and shortly after the war.

The transistor, invented in 1948, has now almost completely replaced the vacuum tube in most of its applications. Incorporating an arrangement of semiconductor materials and electrical contacts, the transistor provides the same functions as the vacuum tube but at reduced cost, weight, and power consumption and with higher reliability. Subsequent advances in semiconductor technology, in part attributable to the intensity of research associated with the space-exploration effort, led to the development of the integrated circuit. Integrated circuits may contain hundreds of thousands of transistors on a small piece of material and allow the construction of complex electronic circuits, such as those in microcomputers, audio and video equipment, and communications satellites.

Electronic Components

▣ Light-Emitting Diode (LED)

Electronic circuits consist of interconnected electronic components. Components are classified into two categories—active or passive. Passive components include resistors, capacitors, and inductors. Components considered active include batteries, generators, vacuum tubes, and transistors.

Vacuum Tubes

▣ Vacuum Tube Amplifier

A vacuum tube consists of an air-evacuated glass envelope that contains several metal electrodes. A simple, two-element tube (diode) consists of a cathode and an anode that is connected to the positive terminal of a power supply. The cathode—a small metal tube heated by a filament—frees electrons , which migrate to the anode—a metal cylinder around the cathode (also called the plate). If an alternating voltage is applied to the anode, electrons will only flow to the anode during the positive half-cycle; during the negative cycle of the alternating voltage, the anode repels the electrons, and no current passes through the tube. Diodes connected in such a way that only the positive half-cycles of an alternating current (AC) are permitted to pass are called rectifier tubes; these are used in the conversion of alternating current to direct current (DC)

(*See* Electricity; Rectification). By inserting a grid, consisting of a spiral of metal wire, between the cathode and the anode and applying a negative voltage to the grid, the flow of electrons can be controlled. When the grid is negative, it repels electrons, and only a fraction of the electrons emitted by the cathode can reach the anode. Such a tube, called a triode, can be used as an amplifier. Small variations in voltage at the grid, such as can be produced by a radio or audio signal, will cause large variations in the flow of electrons from the cathode to the anode and, hence, in the circuitry connected to the anode.

Transistors

- Circuit Board and Transistors

Transistors are made from semiconductors. These are materials, such as silicon or germanium, that are "doped" (have minute amounts of foreign elements added) so that either an abundance or a lack of free electrons exists. In the former case, the semiconductor is called n-type, and in the latter case, p-type. By combining n-type and p-type materials, a diode can be produced. When this diode is connected to a battery so that the p-type material is positive and the n-type negative, electrons are repelled from the negative battery terminal and pass unimpeded to the p-region, which lacks electrons. With the battery reversed, the electrons arriving in the p-material can pass only with difficulty to the n-material, which is already filled with free electrons, and the current is almost zero.

The bipolar transistor was invented in 1948 as a replacement for the triode vacuum tube. It consists of three layers of doped material, forming two p-n (bipolar) junctions with configurations of p-n-p or n-p-n. One junction is connected to a battery so as to allow current flow (forward bias), and the other junction has a battery connected in the opposite direction (reverse bias). If the current in the forward-biased junction is varied by the addition of a signal, the current in the reverse-biased junction of the transistor will vary accordingly. The principle can be used to construct amplifiers in which a small signal applied to the forward-biased junction causes a large change in current in the reverse-biased junction.

Another type of transistor is the field-effect transistor (FET). Such a transistor operates on the principle of repulsion or attraction of charges due to a superimposed electric field. Amplification of current is accomplished in a manner similar to the grid control of a vacuum tube. Field-effect transistors operate more efficiently than bipolar types, because a large signal can be controlled by a very small amount of energy.

Integrated Circuits

- Computer Circuit Board
- Integrated Circuit

Most integrated circuits are small pieces, or "chips", of silicon, perhaps 2 to 4 sq mm (0.08 to 0.15 sq in) in size, in which transistors are fabricated. Photolithography enables the designer to create tens of thousands of transistors on a single chip by proper placement of the many n-type and p-type regions. These are interconnected with very small conducting paths during fabrication to produce complex special-purpose circuits. Such integrated circuits are called monolithic because they are fabricated on a single crystal of silicon. Chips require much less space and power and are cheaper to manufacture than an equivalent circuit built out of individual transistors.

Resistors

If a battery is connected across a conducting material, a certain amount of current will flow through the material. This current is dependent on the voltage of the battery, on the dimensions of the sample, and on the conductivity of the material itself. Resistors with known resistance are used for

current control in electronic circuits. The resistors are made from carbon mixtures, metal films, or resistance wire and have two connecting wires attached. Variable resistors, with an adjustable sliding contact arm, are often used to control volume on radios and television sets.

Capacitors

Capacitors consist of two metal plates that are separated by an insulating material. If a battery is connected to both plates, an electric charge will flow for a short time and accumulate on each plate. If the battery is disconnected, the capacitor retains the charge and the voltage associated with it. Rapidly changing voltages, such as caused by an audio or radio signal, produce larger current flows to and from the plates; the capacitor then functions as a conductor for the changing current. This effect can be used, for example, to separate an audio or radio signal from a direct current in order to connect the output of one amplifier stage to the input of the next amplifier stage.

Inductors

Inductors consist of a conducting wire wound into the form of a coil. When a current passes through the coil, a magnetic field is set up around it that tends to oppose rapid changes in current intensity (*See* Induction). Like a capacitor, an inductor can be used to distinguish between rapidly and slowly changing signals. When an inductor is used in conjunction with a capacitor, the voltage in the inductor reaches a maximum value at a specific frequency that is dependent on both the capacitance and inductance. This principle is used in a radio receiver, where a specific frequency is selected by a variable capacitor.

Sensing Devices and Transducers

Measurements of mechanical, thermal, electrical, and chemical quantities are made by devices called sensors and transducers. The sensor is responsive to changes in the quantity to be measured, for example, temperature, position, or chemical concentration. The transducer converts such measurements into electrical signals, which can be fed to instruments for the readout, recording, or control of the measured quantities. Sensors and transducers can operate at locations remote from the observer and in environments unsuitable or impractical for humans.

Some devices act as both sensor and transducer. A thermocouple has two junctions of wires of different metals; these generate a small electric voltage that depends on the temperature difference between the two junctions. A thermistor is a special resistor, the resistance of which varies with temperature. A variable resistor can convert mechanical movement into an electrical signal. Specially designed capacitors are used to measure distance, and photocells are used to detect light (*See* Photoelectric Cell). Other devices are used to measure velocity, acceleration, or fluid flow. In most instances, the electric signal is weak and must be amplified by an electronic circuit.

Power-Supply Circuits

Most electronic equipment requires DC voltages for its operation. These can be provided by batteries or by internal power supplies that convert alternating current as available at the home electric outlet, into regulated DC voltages. The first element in an internal DC power supply is a transformer, which steps up or steps down the input voltage to a level suitable for the operation of the equipment. A secondary function of the transformer is to provide electrical ground insulation of the device from the power line to reduce potential shock hazards. The transformer is then followed by a rectifier, normally a diode. In the past, vacuum diodes and a wide variety of different materials such as germanium crystals or cadmium sulphide were employed in the low-power rectifiers used in electronic equipment. Today silicon rectifiers are used almost exclusively

because of their low cost and their high reliability.

Fluctuations and ripples superimposed on the rectified DC voltage (noticeable as a hum in a malfunctioning audio amplifier) can be filtered out by a capacitor; the larger the capacitor, the smaller is the amount of ripple in the voltage. More precise control over voltage levels and ripples can be achieved by a voltage regulator, which also makes the internal voltages independent of fluctuations that may be encountered at an outlet. A simple, often-used voltage regulator is the zener diode. It consists of a solid-state p-n-junction diode, which acts as an insulator up to a predetermined voltage; above that voltage it becomes a conductor that bypasses excess voltages. More sophisticated voltage regulators are usually constructed as integrated circuits.

Amplifier Circuits

Electronic amplifiers are used mainly to increase the voltage, current, or power of a signal. A linear amplifier provides signal amplification with little or no distortion, so that the output is proportional to the input. A nonlinear amplifier may produce a considerable change in the waveform of the signal. Linear amplifiers are used for audio and video signals, whereas nonlinear amplifiers find use in oscillators, power electronics, modulators, mixers, logic circuits, and other applications where an amplitude cutoff is desired. Although vacuum tubes played a major role in amplifiers in the past, today either discrete transistor circuits or integrated circuits are generally used.

Audio Amplifiers

Audio amplifiers, such as are found in radios, television sets, citizens band (CB) radios, and cassette recorders, are generally operated at frequencies below 20 kilohertz (1 kHz = 1,000 cycles/sec). They amplify the electrical signal, which is then converted to sound in a loudspeaker. Operational amplifiers (op-amps), built with integrated circuits and consisting of DC-coupled, multistage, linear amplifiers are popular for audio amplifiers.

Video Amplifiers

Video amplifiers are used mainly for signals with a frequency spectrum range up to 6 megahertz (1 MHz = 1 million cycles/sec). The signal handled by the amplifier becomes the visual information presented on the television screen, with the signal amplitude regulating the brightness of the spot forming the image on the screen. To achieve its function, a video amplifier must operate over a wide band and amplify all frequencies equally and with low distortion. *See* Video Recording.

Radio Frequency Amplifiers

These amplifiers boost the signal level of radio or television communication systems. Their frequencies generally range from 100 kHz to 1 gigahertz (1 GHz = 1 billion cycles/sec) and can extend well into the microwave frequency range.

Oscillators

▣ Oscillator Circuit

Oscillators generally consist of an amplifier and some type of feedback: the output signal is fed back to the input of the amplifier. The frequency-determining elements may be a tuned inductance-capacitance circuit or a vibrating crystal. Crystal-controlled oscillators offer the highest precision and stability. Oscillators are used to produce audio and radio signals for a wide variety of purposes. For example, simple audio-frequency oscillators are used in modern push-button telephones to transmit data to the central telephone station for dialling. Audio tones generated by

oscillators are also found in alarm clocks, radios, electronic instruments, computers, and warning systems. High-frequency oscillators are used in communications equipment to provide tuning and signal-detection functions. Radio and television stations use precise high-frequency oscillators to produce transmitting frequencies.

Switching and Timing Circuits

- Digital Logic and NOR Gate Circuitry
- Digital Circuits and Boolean Truth Tables

Switching and timing circuits, or logic circuits, form the heart of any device where signals must be selected or combined in a controlled manner. Applications of these circuits include telephone switching, satellite transmissions, and digital computer operations.

Digital logic is a rational process for making simple "true" or "false" decisions based on the rules of Boolean algebra. "True" can be represented by a 1 and "false" by a 0, and in logic circuits the numerals appear as signals of two different voltages. Logic circuits are used to make specific true-false decisions based on the presence of multiple true-false signals at the inputs. The signals may be generated by mechanical switches or by solid-state transducers. Once the input signal has been accepted and conditioned (to remove unwanted electrical signals, or "noise"), it is processed by the digital logic circuits. The various families of digital logic devices, usually integrated circuits, perform a variety of logic functions through logic gates, including "OR", "AND", and "NOT", and combinations of these (such as "NOR", which includes both OR and NOT). One widely used logic family is the transistor-transistor logic (TTL). Another family is the complementary metal oxide semiconductor logic (CMOS), which performs similar functions at very low power levels but at slightly lower operating speeds. Several other, less popular families of logic circuits exist, including the currently obsolete resistor-transistor logic (RTL) and the emitter coupled logic (ELC), the latter used for very-high-speed systems.

The elemental blocks in a logic device are called digital logic gates. An AND gate has two or more inputs and a single output. The output of an AND gate is true only if all the inputs are true. An OR gate has two or more inputs and a single output. The output of an OR gate is true if any one of the inputs is true and is false if all of the inputs are false. An INVERTER has a single input and a single output terminal and can change a true signal to a false signal, thus performing the NOT function. More complicated logic circuits are built up from elementary gates. They include flip-flops (binary switches), counters, comparators, adders, and more complex combinations.

To perform a desired overall function, large numbers of logic elements may be connected in complex circuits. In some cases microprocessors are used to perform many of the switching and timing functions of the individual logic elements. The processors are specifically programmed with individual instructions to perform a given task or tasks. An advantage of microprocessors is that they make possible the performance of different logic functions, depending on the program instructions that are stored. A disadvantage of microprocessors is that normally they operate in a sequential mode, which may be too slow for some applications. In these cases specifically designed logic circuits are used.

Recent Developments

The development of integrated circuits has revolutionized the fields of communications, information handling, and computing. Integrated circuits reduce the size of devices and lower manufacturing and system costs, while at the same time providing high speed and increased reliability. Digital watches, hand-held computers, and electronic games are systems based on microprocessors. Other developments include the digitalization of audio signals, where the frequency and amplitude of an audio signal are coded digitally by appropriate sampling

techniques, that is, techniques for measuring the amplitude of the signal at very short intervals. Digitally recorded music, as found on compact discs, shows a fidelity that is not possible using direct-recording methods.

Medical electronics has progressed from computerized axial tomography, or the use of CAT or CT scanners (*See* X-Ray), to systems that can discriminate more and more of the organs of the human body. Devices that can view blood vessels and the respiratory system have been developed as well. Ultrahigh definition television also promises to substitute for many photographic processes, because it eliminates the need for silver.

Today's research to increase the speed and capacity of computers concentrates mainly on the improvement of integrated circuit technology and the development of even faster switching components. Very-large-scale integrated (VLSI) circuits that contain several hundred thousand components on a single chip have been developed. Very-high-speed computers are being developed in which semiconductors may be replaced by superconducting circuits using Josephson junctions (*See* Josephson Effect) and operating at temperatures near absolute zero.

Resistor, component used to control the size of the current that flows in an electronic or electric circuit. The size of the current that flows depends on several factors, including a property of the component called its resistance. The greater the resistance, the smaller the current. Resistance is very small in the wires joining components, but is significant in the components themselves.

Fixed-value resistors are described in terms of their resistance (measured in ohms), their tolerance (the maximum possible difference between the actual value of the resistance and its nominal value, measured as a percentage of the nominal value), and their power rating (measured in watts). As a larger current passes through a resistor, the resistor heats up: the power rating describes the maximum power that may be dissipated in the form of heat before the resistor is damaged.

Resistors may be made from carbon, metal oxide, or a coil of wire. Carbon resistors are cheap but difficult to make with precisely specified resistance. Wire resistors are useful for high power, since they dissipate heat more readily than other types. Metal oxide resistors can be small, with an accurately specified resistance that does not change with time, and are suitable when high power is not required. A fixed-value resistor has a series of coloured bands around its body, which signifies the resistor's value and tolerance.

Variable resistors are ones whose resistance can be varied between an upper and lower limit. They may be adjusted by rotary or linear controls, and are often used in sound level and tone controls on radio sets and sound systems. They need to be specified in terms of their resistance range and power rating, as fixed-value resistors are. Some variable resistors are designed to provide equal increases in resistance for equal amounts of turn of the control knob—for example, 10 kΩ (10,000 ohms) for every 10° of turn. Others are designed to double the resistance every time the knob is turned by a given amount.

Neon Lamp, glass bulb or tube containing the gaseous element neon at low pressure, and two metallic electrodes. The lamp produces a reddish-orange glow when an electric current, applied across the electrodes, is raised in voltage to the point at which it ionizes the gas in the tube (*See* Electric Lighting; Ionization). The voltage at which the lamp glows varies with the design of the tube. When gas in the tube is ionized, the voltage drop across the tube is nearly constant, regardless of the amount of current flowing through the tube. For this reason very small neon lamps are often used in electronic devices as voltage regulators to provide a constant direct-current voltage. These lamps are also used sometimes as pilot lamps to indicate whether or not a piece of electric equipment is drawing current.

Another kind of neon lamp is a glass tube containing ionized neon at very low pressure. The tube shines with a brilliant red glow if a high-voltage alternating current is applied to electrodes sealed in the ends of the tube. Neon lamps of this type, and lamps using other gaseous elements such as argon or krypton, are used extensively for advertising signs. *See* Luminescence.

Relay, specialized electrical switch by means of which a high-power device can be controlled by a device of much lower power. It consists of an electromagnet coil and mechanical switch contacts that are pushed and pulled by the electromagnet. The electromagnet requires a current of only a few hundred milliamps, produced by only a few volts, whereas the contacts may be subject to hundreds of volts and tens of amps may pass through them. The switch therefore enables a small electric current and voltage to control a much larger current and voltage.

Many small switches and electronic circuits cannot withstand large electric currents (often, no more than 1 amp) and would be unable to control, for example, a car headlamp bulb, which requires a current of many amps. This may be achieved by placing a relay between the small switch on the car dashboard and the high-powered headlamp bulb.

Relay coils are available for a wide range of voltages, and some are designed to control many different switch contacts simultaneously.

BIBLIOGRAPHY

Elektrotechniek,materialen en gereedschapleer 1
P.Osinga en W.van Verseveld

How things work 1 and 2
George Allen and Unwin

Techniek in woord en beeld
Prisma

Elementaire Elektrotechniek 1a
Balhaus,Kleintjes

Over de werking van de kurketrekker en andere machines
David Macaulay

Vaktheorie 1 en 2
S.F.Piazza

Electronica,echt niet moelijk,deel 4:experimenten met optiek
A.Schommers

Chips,sensoren en computers
W.Conrad

304 schakelingen
G.H.Nachbar

Leerboek electronica deel 1,2, en 3
A.J.Dirksen

Ontwerpen electrotechnische installaties 2
J.P.J.Elants,G.W.Ijzermans

The material of invention
Ezio Manzini

Art of the electronic age
Frank Popper

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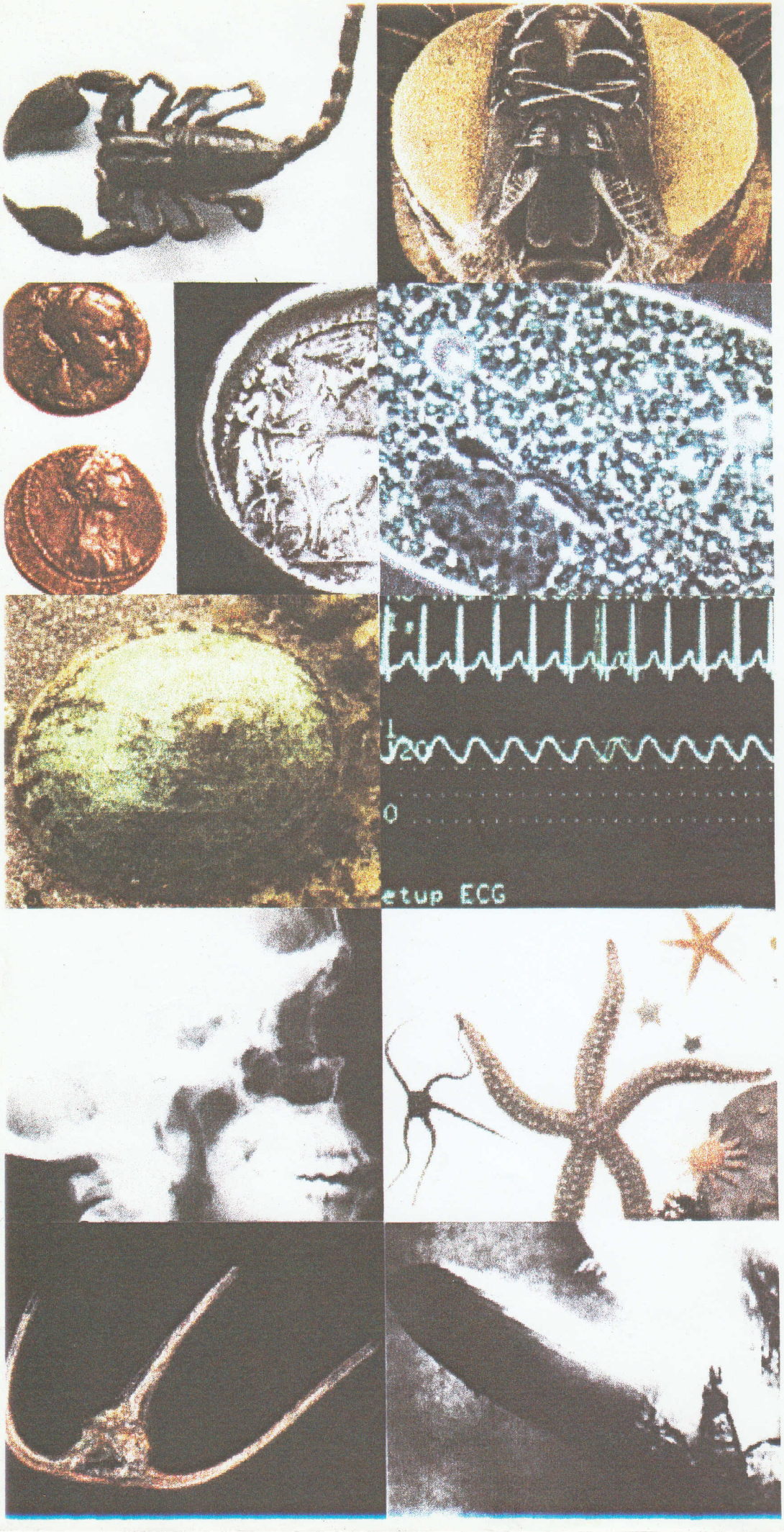
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